POLAR BEAR DENNING SURVEY
MANSEL ISLAND

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ABSTRACT

A study was undertaken from 5-26 March 1978 to locate and count polar bear (Ursus maritimus) dens on Mansel Island, N.W.T. Fifteen maternity dens, three temporary dens and 16 sets of tracks were found. Two adult bears were sighted from the air and three adult females with cubs of the year were sighted from the ground. Tracks near the dens indicated the presence of 28 bears in the study area. The northeast portion of the island proved to be the most productive denning area. A comparison of our results with those of a summer 1976 aerial survey conducted by the Quebec Wildlife Service showed no relationship between summer sightings and denning areas other than that bears are on the island in summer and are in dens there during the winter.

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INTRODUCTION

An aerial survey in 1967 by C. Jonkel, Canadian Wildlife Service, revealed that Mansel Island was used by polar bears and polar bear family groups during the summer. In the summer of 1976, the Quebec Wildlife Service conducted an aerial survey to determine the numbers and location of polar bears on the island. A total of 31 bears was sighted, predominantly on the west half of the island.

To date no maternity denning surveys have been carried out in March when females and cubs are emerging from the dens to determine the polar bear productivity of Mansel Island.

The purpose of our survey was to locate and count polar bear dens and to collect productivity data. The projected dates for this survey were 5 March to 26 March 1978 which would give 3 weeks to survey all areas of the island.

Study Area

Mansel Island is located in Hudson Bay off the northwest corner of Quebec at approximately 62°00'N, 79°45'W. Rough calculations (dot grid) show that Mansel

Island covers an approximate area of 3,150 km^2. The island is about 95 km long and about 40 km wide at its widest point.

The island is terraced with raised beaches, dotted with numerous small lakes, and crossed by numerous strand lines. It is divided by a west to east system of elongated lakes and interconnecting rivers located centrally on the island. Smaller rivers flow from the north and from the south into this system. The northern portion of Mansel Island is substantially more hilly with more definite river systems than the southern portion.

METHODS

The survey lasted 12 days from 5 March to 16 March. Practically all possible denning areas were searched.

Three Twin Otter flights were made to establish two caches. Appendix I lists the supplies and equipment used. One cache was located on 5 March on the west side of Swaffield Harbour at $62^{o}22'N$, $79^{o}44'W$ (north camp) and another on 6 March on a large unnamed lake at $61^{o}57'N$, $79^{o}34'W$ (south camp). The camp locations were established by considering their proximity to likely denning areas. It was decided that a camp on the extreme south end of the island would be too far away from any likely denning areas for practical travelling purposes.

The most likely areas for locating polar bear dens were determined from a study of a 1:250,000 map of the island and after observing the island from the air.

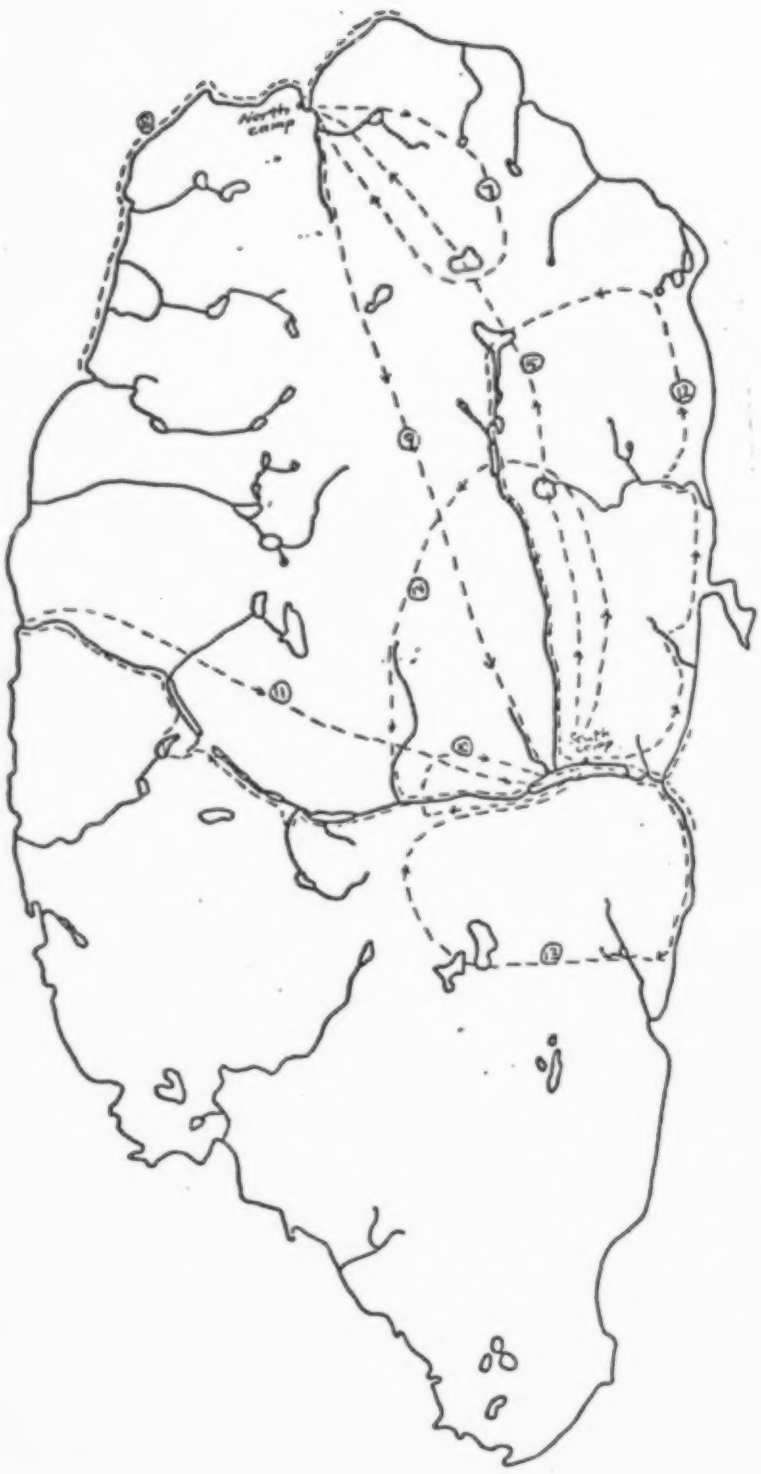
We planned to commence work at the north camp, move to the south camp, and then return to the north camp. This would allow us to double check any dens found in the vicinity of either camp.

Polar bear signs were recorded during the survey. Sightings fell into five categories: aerial sightings, ground sightings, maternity dens, temporary dens, and tracks. A temporary den was defined as one consisting of only a shallow depression in the snow or gravel. Maternity dens were classed as either occupied or unoccupied. Every effort was taken to locate and count tracks around dens to determine the number, sex and age of bears using the dens.

The approximate age (in days) of any tracks found was recorded along with the direction of travel, number of bears, and, if possible, the sex and age of the bears. All data were summmarized daily. Figure 1 shows the travel paths taken during the survey.

RESULTS

The northeast portion of the island from Swaffield Harbour down to the mouth of the river at $61^{o}56'N$,



Areas covered by ski-doo

Numbers on dashed lines are the dates of the trip

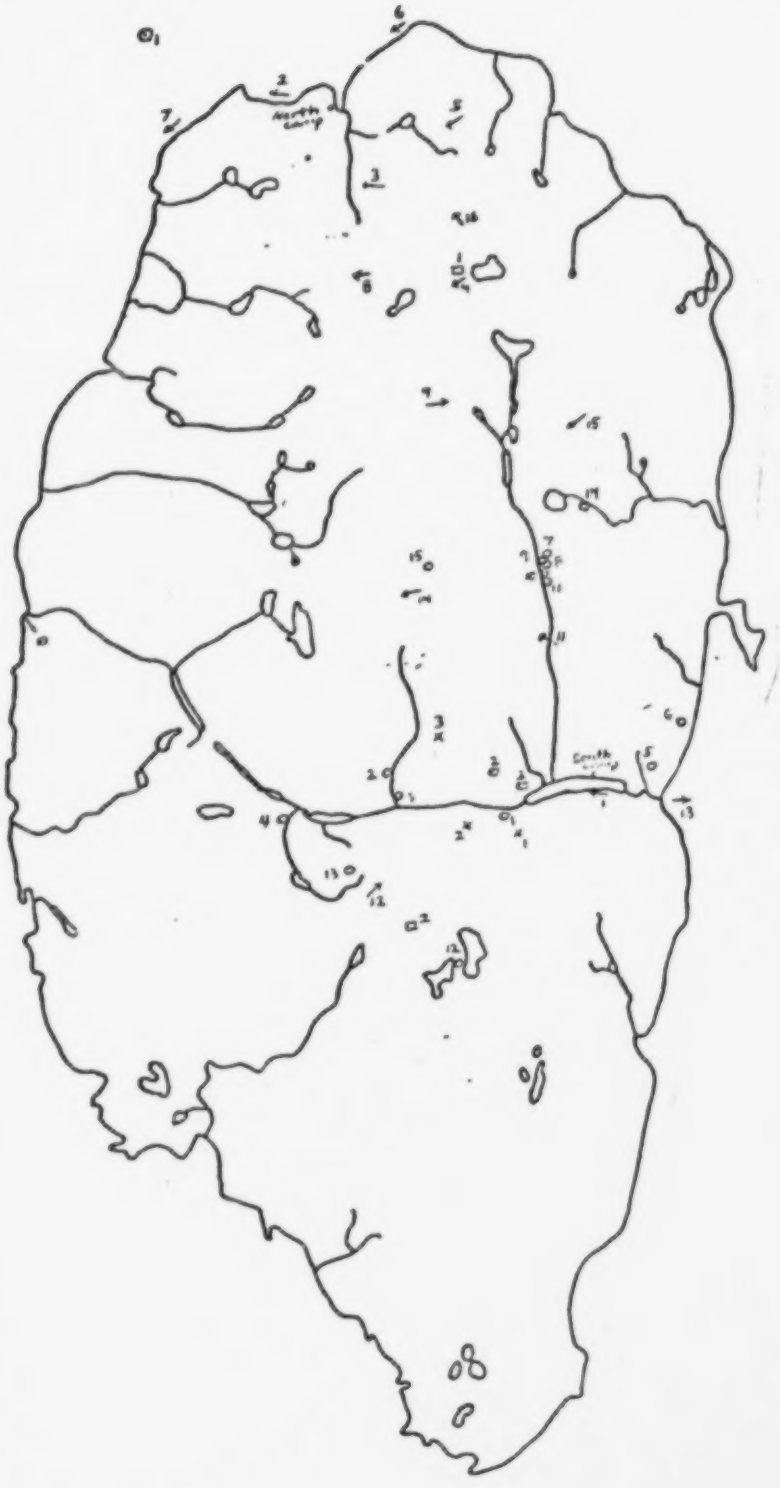
3.5 mm = 1.6 km

Figure 1. Routes followed during Mansel Island denning survey, March 1978.

79°27'W and the area bordering the whole east-west river and lake systems appeared to be promising denning areas. The rivers on the northeast coast had steep sides and deep snow banks 1.5 - 3 km inland. The central east-west river system had many creeks and rivers flowing into it. The northwest portion of the island from the air appeared to be flat and featureless, lacking any well defined river systems.

A total of 15 maternity dens, three temporary dens, and 16 sets of tracks were found. Two adult bears were sighted from the air and three adult females with two cubs of the year each were sighted on the ground. Tracks found around the maternity dens indicated the presence of at least six adult females and nine cubs of the year, a total of 15 bears. There were four abandoned maternity dens and 11 occupied dens. Five of the occupied dens had no tracks around them to indicate the number of bears inside. Sets of bear tracks found away from dens indicated the presence of six adult males, seven adult females, six sub-adults of unknown sex, eight cubs of the year, and one bear of unknown sex and age for a total of 28 bears.

Figure 2 shows the locations of sightings, tracks and dens. Details concerning dens are listed in Table 1. Details concerning tracks are listed in Table 2. Appen-



Locations of sightings, dens, tracks

o maternity den
□ temporary den
→ tracks
x ground sighting
o aerial sighting

3.5 mm = 1.6 km

Figure 2. Location of sightings, dens and tracks - Mansel Island denning survey, March, 1978.

Table 1. Polar bear denning sites found on Mansel Island during March 1978 denning survey.

Date (Mar. 1978)	Den No.	Location	Status[1]	Expo-sure	Sex & age of bears[2]
10	1	61°57'N, 79°44'W	ab	W	1 Ad. F, 2C
10	2	61°58'N, 79°47'W	oc	W	1 Ad. F, 2C
11	3	61°57'N, 79°47'W	oc	W	1 Ad. F, 2C
11	4	61°56'N, 79°55'W	oc	E	no tracks
12	5	61°57'N, 79°29'W	ab	S	1 Ad. F, 1C
12	6	61°58'N, 79°25'W	oc	E	no tracks
12	7	62°04'N, 79°34'W	oc	W	no tracks
12	8	62°04'N, 79°34'W	oc	W	no tracks
12	9	62°04'N, 79°34'W	oc	W	no tracks
12	10	62°04'N, 79°34'W	oc	W	1 Ad. F, 2C
12	11	62°04'N, 79°34'W	oc	W	1 Ad. F
13	12	61°52'N, 79°44'W	oc	S	no tracks
13	13	61°56'N, 79°52'W	ab	NW	no tracks
14	14	62°07'N, 79°30'W	ab	SE	no tracks
14	15	62°05'N, 79°43'W	ab	SE	no tracks

[1] ab - abandoned
oc - occupied

[2] Ad. - adult
F - female
C - cub

Table 2. Tracks seen during March 1978 Mansel Island polar bear denning survey.

Date (Mar. 1978)	Track No.	Location	Direction	Sex	Age[1]	Age of tracks (days)
6	1	61°57'N, 79°32'W	?	?	?	?
6	2	62°23'N, 79°47'W	W	M	Ad.	2
7	3	62°21'N, 79°43'W	W	F	Ad.	1
				?	C	1
				?	C	1
7	4	62°16'N, 79°36'W	SW	F	Ad.	2
7	5	62°22'N, 79°36'W	SW	F	Ad.	1
7	6	62°24'N, 79°37'W	SW	M	SA.	1
				M	SA.	1
8	7	62°23'N, 79°56'W	SW	M	Ad.	1
9	8	62°17'N, 79°44'W	W	M	Ad.	1/2
9	9	62°12'N, 79°40'W	E	M	Ad.	1/2
11	10	62°06'N, 80°13'W	SE	M	Ad.	2
12	11	62°02'N, 79°34'W	W	F	Ad.	2
				?	C	2
				?	C	2
13	12	61°55'N, 79°51'W	NE	M	Ad.	3
13	13	61°56'N, 79°26'W	E	?	SA.	1
				?	SA.	1
14	14	62°03'N, 79°44'W	W	F	Ad.	2
15	15	62°10'N, 79°31'W	SW	F	Ad.	1/2
				?	C	1/2
				?	C	1/2
15	16	62°17'N, 79°36'W	NW	F	Ad.	1/2
				?	C	1/2
				?	C	1/2

[1] Ad. - adult, SA. - subadult, C - cub of the year

dix II is a daily log of the survey, giving detailed descriptions of dens, tracks, sightings, distances travelled and areas covered.

DISCUSSION

The survey covered approximately 50% of the island (1580 km^2) with about 450 km logged by skidoo. Areas not covered on the ground were observed from the air during the caching and removal flights. Those areas were found to be generally flat with much exposed broken rock, raised beaches, and many small lakes. It was considered impractical to attempt to cover such areas as the snow machines were in poor shape (broken springs, engine problems) and the sled used for hauling gear was close to falling apart toward the end of the survey.

CONCLUSIONS

From the data collected on this survey, the areas shown on Figure 3 have been determined to be either denning areas or possible denning areas. The remainder of the island can be considered a low density denning area. This includes the northeast and southeast portion as well as the area on the west side of the central lake

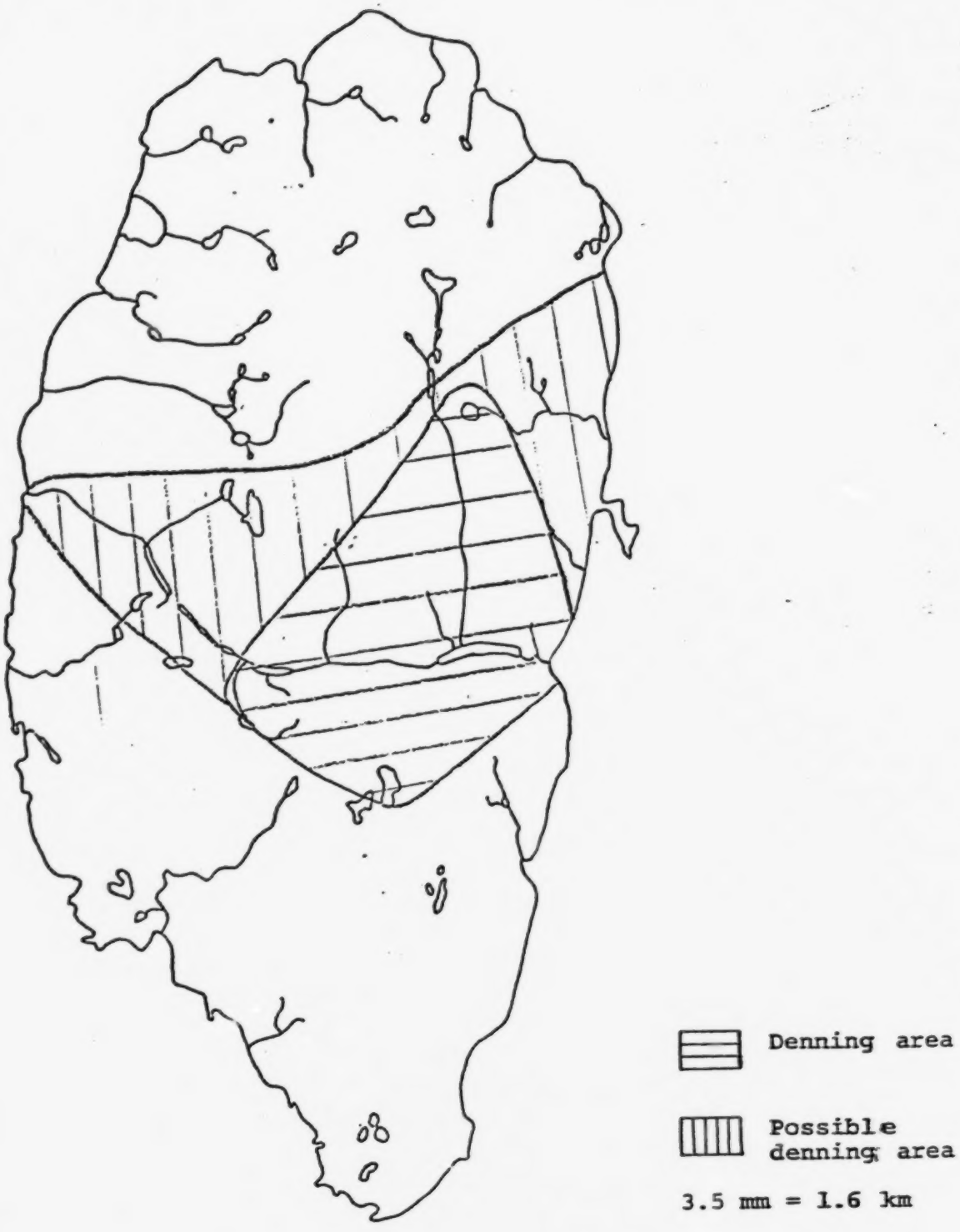


Figure 3. Denning areas or possible denning areas on Mansel Island, March 1978.

and river system. These low density denning areas would prove to be costly and time consuming to survey because of the rough terrain. Denning appears to be in areas of hilly terrain and along creeks and river banks where the snow depth is conductive to den building. From the information provided in the Quebec survey, there does not appear to be any direct relationship between summer sightings and denning areas other than that bears are on the island in the summer and are in dens there in the winter.

RECOMMENDATIONS

If a denning survey is done on Mansel Island in the spring of 1979, all areas concluded as denning and possible denning areas should be surveyed. If this work results in similar denning patterns being observed, it will prove that these areas are used year after year. Those areas concluded as low density denning areas should not be surveyed unless time permits. They did not appear to be good denning areas from aerial or ground observations, and to survey them would entail a great deal of time and effort which would be better spent on areas proven to be more important. The terrain in these areas is rough (raised beaches, covered with broken rock and

little snow cover) and maintenance of machines would become a major problem.

In order to cover the important denning areas on the island with the greatest efficiency, only one base camp is required near this year's south camp location. A larger double-walled 12x14 tent should be taken, and a Coleman oil burner should be used for heating.

The survey was timed exactly right this year for finding dens and tracks. At least one further similar survey should be carried out in 1979 to verify the findings contained in this report. A tagging project should be conducted in the summer of 1978 to determine the extent of the movement of bears in the Mansel Island area to delineate the population's range.

ACKNOWLEDGEMENTS

I am grateful to my two guides, Johnassie Nakoolak and Bobby Shapagnak of Coral Harbour, N.W.T., whose knowledge of the land and infinite patience helped make this survey a success. My thanks also to Eddy O'Shea of Coral Harbour for faithfully maintaining daily radio communication with us while we were on Mansel Island. Lambair's Twin Otter pilots are thanked for safe transportation to the island.

Appendix 1. Equipment, supplies and costs for March 1978, Mansel Island polar bear denning survey.

Equipment

1. 340 Olympique skidoo
2. 340 TNT skidoo
3. 340 Liquifire skidoo, John Deere
4. Komatik
5. 8' x 10' double wall tent
6. 10' x 12' single wall tent
7. Coleman stoves - 2 (heating and cooking)
8. CP-24 radio
9. Coleman lanterns - 2
10. Miscellaneous camping gear - sleeping bags, utensils, scaring devices, shotgun, rifle shells, etc.

Supplies

1. Spare machine parts:

Item	Number Taken	Number Used	Cost	Total
Fan belts	2	2	6.00	12.00
Drive belts	5	3	11.00	33.00
Spark plugs	12	6	1.00	6.00
Bogey wheel springs	4	2	6.00	12.00
Bearings	2	0		
Skis	3	0		
Drive chain	1			
Pull rope	1	1		
Gas filters	2		(Stocked at	
Thermostat	1		Station)	
Runner	1			
			TOTAL	$63.00

FUEL (total taken)

* Regular fuel	540 Gal.	@ $1.10/gal =	$ 594.00
Naphtha	20 Gal.		45.00
* Oil	10 Cases	STOCK	
		TOTAL	$ 639.00

* 4-45 gal. drums and 3 cases oil cached for next season's work at north camp.

* 4-45 gal. drums and 3 cases oil cached for next season's work at south camp.

One snowmobile failed completely after the third day. This saved fuel; however, it is fortunate that it was not needed to complete the work.

Food and Miscellaneous

Food	$ 370.00	
Miscellaneous	205.00	
	$ 575.00	

Casual Wages

2 men (328 hours) $ 2,014.00

Air Charter - Twin Otter

Inward removal	$ 7,143.00	
Outward removal	5,011.00	
		$12,154.00

* Summary of Costs

Supplies	$ 63.00	
Fuel	639.00	
Food and Miscellaneous	575.00	
Casual Wages	2,014.00	
Air Charter	12,154.00	
		$15,445.00

* According to arrangements made with Dr. C. Jonkel prior to this survey it was decided that he would pay for the air charters. The Fish and Wildlife Service's contribution was the difference, plus providing an Officer, making all arrangements, and carrying out the work.

Appendix II. Daily log of March 1978. Mansel Island polar bear denning survey.

5 March

After the first caching flight, a single adult bear (1) of undetermined sex was sighted on the pressure ice about 5 km north of the island.

6 March

During the second caching flight, a set of tracks (1) was seen south of the lake on which the second cache was located. A single adult bear (2), sex unknown, was sighted on a creek bed near a small unnamed lake on the reconnaissance trip over the northwest portion of the island. After the north camp was set up, the two guides travelled west of the camp: one set of adult male tracks (2) heading west were seen.

7 March

The area south and east of the north camp was covered in a 60 km oval loop. Three sets of tracks were crossed. The first set (3) was of a female and two cubs of the year heading west and the second set (4) was of a single adult female heading southwest from a temporary den (1). This den was in a snow bank facing east on the side of a hill and was about 2 m long by 1 m by .5 m deep. The third set of tracks (5) was of an adult female, heading west.

In the early evening the guides reported seeing two sets of tracks (6) of sub-adult males that were heading westward.

8 March

Only one set of tracks (7) of an adult male were found following the northwest coast. From early morning

to late evening a strong north-northwest wind caused high ground drifting that reduced travel time to about 1 hour (16 km).

9 March

Moved to the south camp. Two sets of tracks were crossed (8,9) both of adult males travelling in opposite directions. Total distance traveled was about 65 km.

10 March

A short trip of about 40 km was carried out in a loop to the west of camp. Two den sites were located. The first (1) was found on a river bank facing west about 4.5 m up from the river surface. There were two deep dens, both abandoned, and three shallow depressions nearby. Tracks of an adult female and two cubs of the year were around the den site.

The second den (2) was found about 3 km further west on a different creek bank. There was only a single den, occupied, facing west about 6 km up from the creek surface. The slope of the bank was about 30^{o}. Tracks of an adult female and two cubs of the year were nearby.

Three females, each with two cubs of the year, were sighted (1,2,3) during the day. From the direction and freshness of the tracks, the guides felt that the second bear sighted (2) may have just emerged from den #1.

11 March

A trip along the central lake and river system to the west coast was made and resulted in the finding of two dens. The first den (3) was found on the same creek as den #2, about 1 km south of it. It was on the east bank facing west about 6 m up from the creek surface, on

a 30° slope. This den was occupied and there were tracks of an adult female and two cubs of the year around the den site.

The second den (4) was found about 6 km west of den #3, on a river bank facing east. The den was occupied with no tracks nearby.

Continuing on to the west we came across three sets of caribou tracks about 1 to 2 weeks old. No other signs of caribou or caribou were seen for the remainder of the survey.

On the west coast, one set of tracks (10) were found heading southeast. From the size of the prints, the guides thought that the bear was a male. Total distance travelled was about 95 km.

12 March

The rivers north of camp, flowing east into Hudson Bay, were searched. Seven dens were located on this trip.

The first den (5) was at the top of a steep snow bank (slope of 40°) about 9 m from the base. It was abandoned, but tracks nearby indicated that it was used by an adult female and at least one cub of the year.

The second den (6) was at the top of a cliff about 15 to 18 m high, facing east. This den was closed and occupied and no tracks were found nearby.

To determine if a den was occupied, a check was made for any tracks in the immediate vicinity of the den opening, and for a breathing vent. An abandoned den usually had tracks around it and the den was open, with no snow blocking the entrance.

The remaining five dens were found within .5 km of each other on a river flowing south towards camp. They

were all on the same bank, facing west, about 4 to 6 m from the river surface on a slope of 25°.

Three of these dens (7,8,9) were within 6 m of each other, still closed and occupied. The air vent holes in each were still open and no tracks were found around these dens. The other two dens (10,11) had been both opened prior to our visit and were occupied. The tracks of an adult female with two cubs of the year were around den #10. Den #11 had tracks of a single adult female around it and droppings lying downslope from the den mouth.

One set of tracks (11), about 2 days old, were found of an adult female and two cubs of the year heading northwest about 3 km south of the five dens. Total distance travelled was about 70 km.

13 March

The area immediately south of camp was searched and resulted in the finding of two maternity dens and one temporary den. The first den (12) was located on the side of an esker, slope about 20°, facing south. This den was closed and occupied and no tracks could be found.

The second den (13) was also on the side of an esker, slope about 30°, facing to the northwest. This den was abandoned but no tracks were found nearby. The temporary den (2) was on the side of a gravel bank and consisted of two large but shallow depressions dug into the gravel, facing north. One set of tracks (12) about 3 days old, of a single adult male heading northeast were found. Another set of tracks (13), about 1 day old, of two sub-adult bears were found heading east on the sea ice after we had returned to camp. Total distance travelled was about 45 km.

14 March

On a trip to the northwest of camp, two maternity dens, one temporary den, and one set of tracks were located. The maternity dens (14,15) were on the sides of low hills, slope about 25°, about 5 m from the base, facing southeast. Both dens were abandoned with no tracks nearby.

The tracks (14) were of an adult female with two cubs of the year heading west. The temporary den (3) was a single shallow depression in a gravel bed facing north. Total distance travelled was about 65 km.

15 March

Camp was struck and moved to the north end of the island to prepare for removal. A fuel and oil cache was set up near the south camp (four 45 gallon drums of regular gas and three cases of oil). On the trip to the north camp, two sets of tracks were crossed. The first (15) was of an adult female and two cubs of the year heading southwest. The second set was of an adult female and two cubs of the year heading northwest. Both sets of tracks were about 1 day old. Total distance travelled about 45 km.

16 March

A fuel and oil cache was made at the north camp (four 45 gallon drums of regular gas and three cases of oil). Removal of equipment and supplies took two flights. During the second flight a pass was made over the south portion of the island to check for likely denning areas and to look for caribou.